

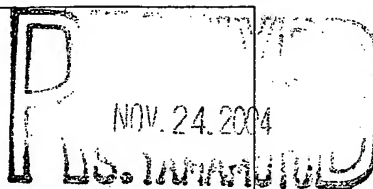
PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

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NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing
(day/month/year)

19.11.2004

Applicant's or agent's file reference
02R00087/PC

IMPORTANT NOTIFICATION

International application No.
PCT/JP 03/10420

International filing date (day/month/year)
18.08.2003

Priority date (day/month/year)
23.08.2002

Applicant
SHARP KABUSHIKI KAISHA et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international
preliminary examining authority:



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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



| | | |
|---|--|--|
| Applicant's or agent's file reference 02R00087/PC | FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416) | |
| International application No. PCT/JP 03/10420 | International filing date (day/month/year) 18.08.2003 | Priority date (day/month/year) 23.08.2002 |
| International Patent Classification (IPC) or both national classification and IPC H01L21/203 | | |
| Applicant SHARP KABUSHIKI KAISHA et al. | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☒ Certain observations on the international application

| | |
|---|---|
| Date of submission of the demand 22.03.2004 | Date of completion of this report 19.11.2004 |
| Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 | Authorized Officer Wolff, G Telephone No. +49 89 2399-2578  |

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/JP 03/10420

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-29 as originally filed

Claims, Numbers

1-10 as originally filed

Drawings, Sheets

1/4-4/4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/JP 03/10420

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|-------------|------|
| Novelty (N) | Yes: Claims | 1-10 |
| | No: Claims | |
| Inventive step (IS) | Yes: Claims | |
| | No: Claims | 1-10 |
| Industrial applicability (IA) | Yes: Claims | 1-10 |
| | No: Claims | |

2. Citations and explanations

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

0 This IPER is based on the following documents cited in the search report:

- D1: APPLIED PHYSICS LETTERS, vol. 64, no. 13, 28 March 1994, pages 1687-1689, XP000441256
- D2: JAPANESE JOURNAL OF APPLIED PHYSICS, vol. 34, no. 10B, PART 2, 15 October 1995, pages L1332-L1335, XP000702227
- D3: EP-A-1 061 564
- D4: EP-A-1 164 210
- D5: US-A-5 602 418

1 From D1, see in particular page 1687, right-hand column, a method of growing a semiconductor layer structure is known, the method comprising the steps of:

- growing a first (Al,Ga)N layer over a substrate at the first substrate temperature using ammonia as the nitrogen precursor;
- cooling the substrate to a second substrate temperature lower than the first substrate temperature, while maintaining the supply of ammonia to the substrate;
- growing an (In,Ga)N quantum well structure over the first (Al,Ga)N layer using ammonia as the nitrogen precursor;
- heating the substrate to a third substrate temperature higher than the second substrate temperature, while maintaining the supply of ammonia to the substrate; and
- growing a second (Al,Ga)N layer over the quantum well structure at the third substrate temperature using ammonia as the nitrogen precursor.

Thus, the subject-matter of claim 1 differs from the state of the art known from D1 only in that

- (i) all growth steps are carried out by MBE, and in that
- (ii) during the cooling and heating steps the supply of ammonia is maintained.

However, it is well-known in the art to use MBE instead of MOCVD for growing group III/V nitride semiconductor structures, see e.g. D3, D4 and D5. Furthermore,

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/JP 03/10420

it is also well-known to maintain the flow of ammonia during additional steps between the growth steps, see e.g. D3 (paragraph [0023]) and/or D4 (abstract).

Thus, the subject-matter of claim 1 does not involve an inventive step (Article 33(3) PCT).

- 2 The additional features of dependent claims 2-7 are also known from D1.
- 3 In view of the above also the subject-matter of device claims 8-10 is obvious for the person skilled in the art.